Historical statistical perspective on flying safety, including combat vs non-combat losses

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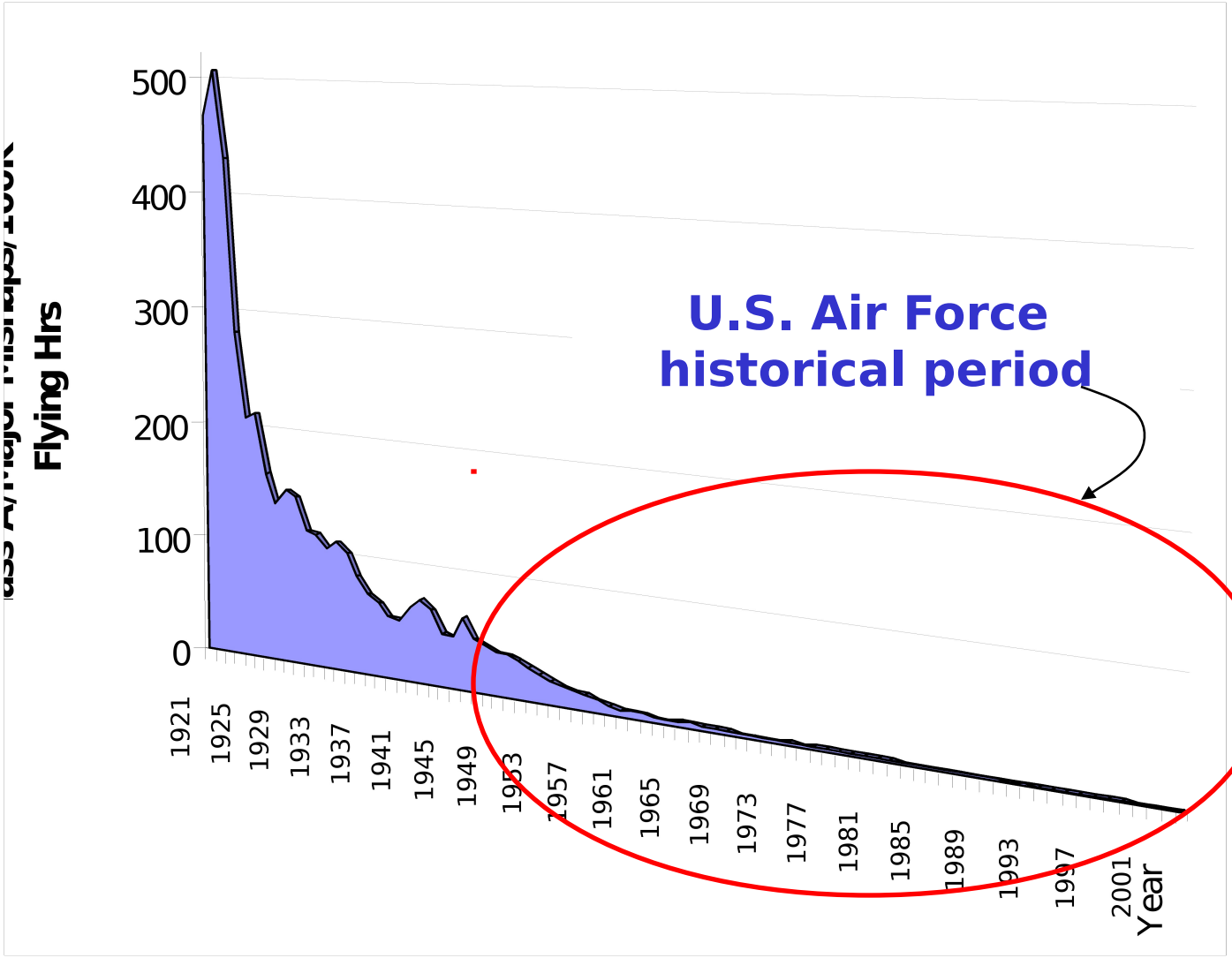
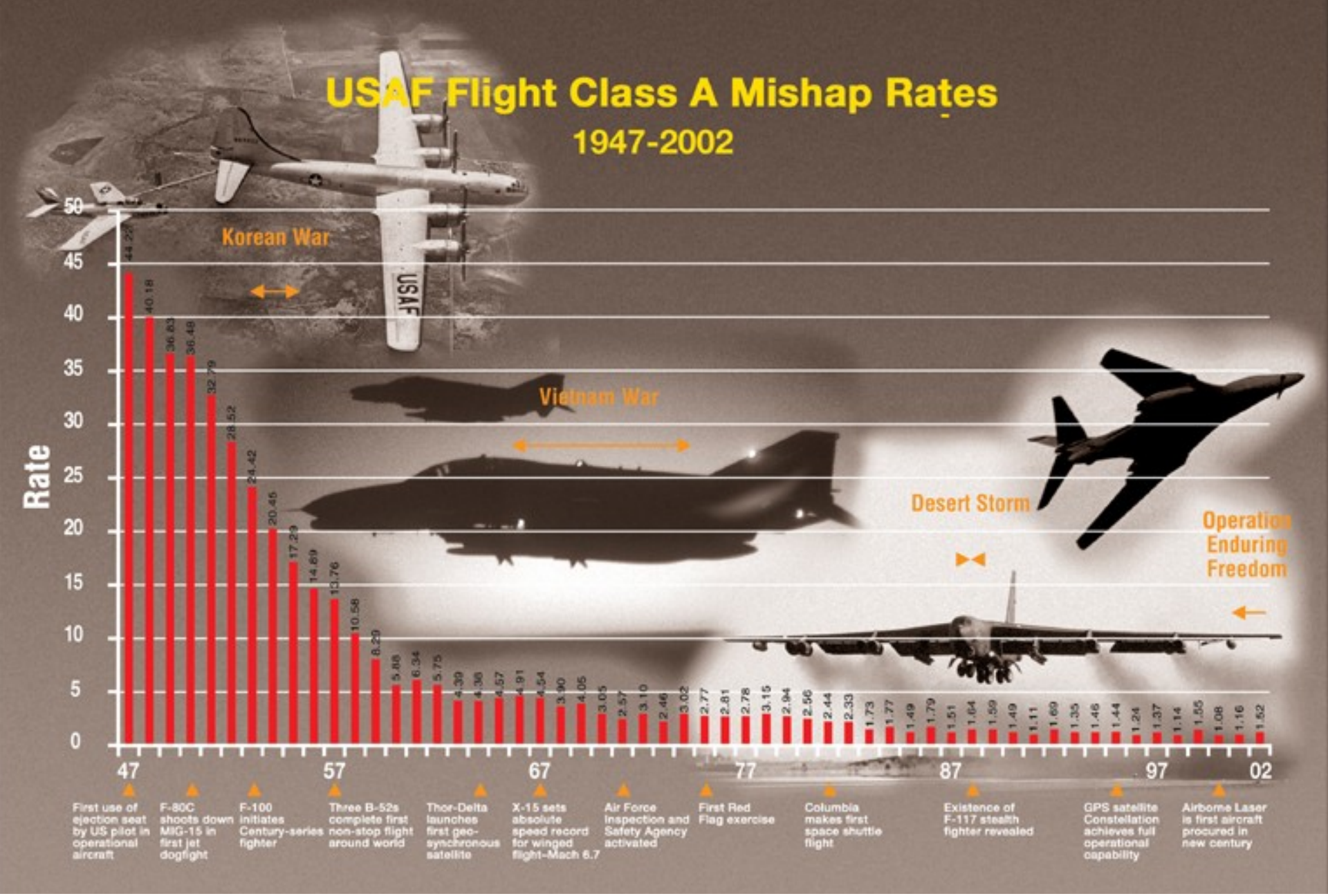
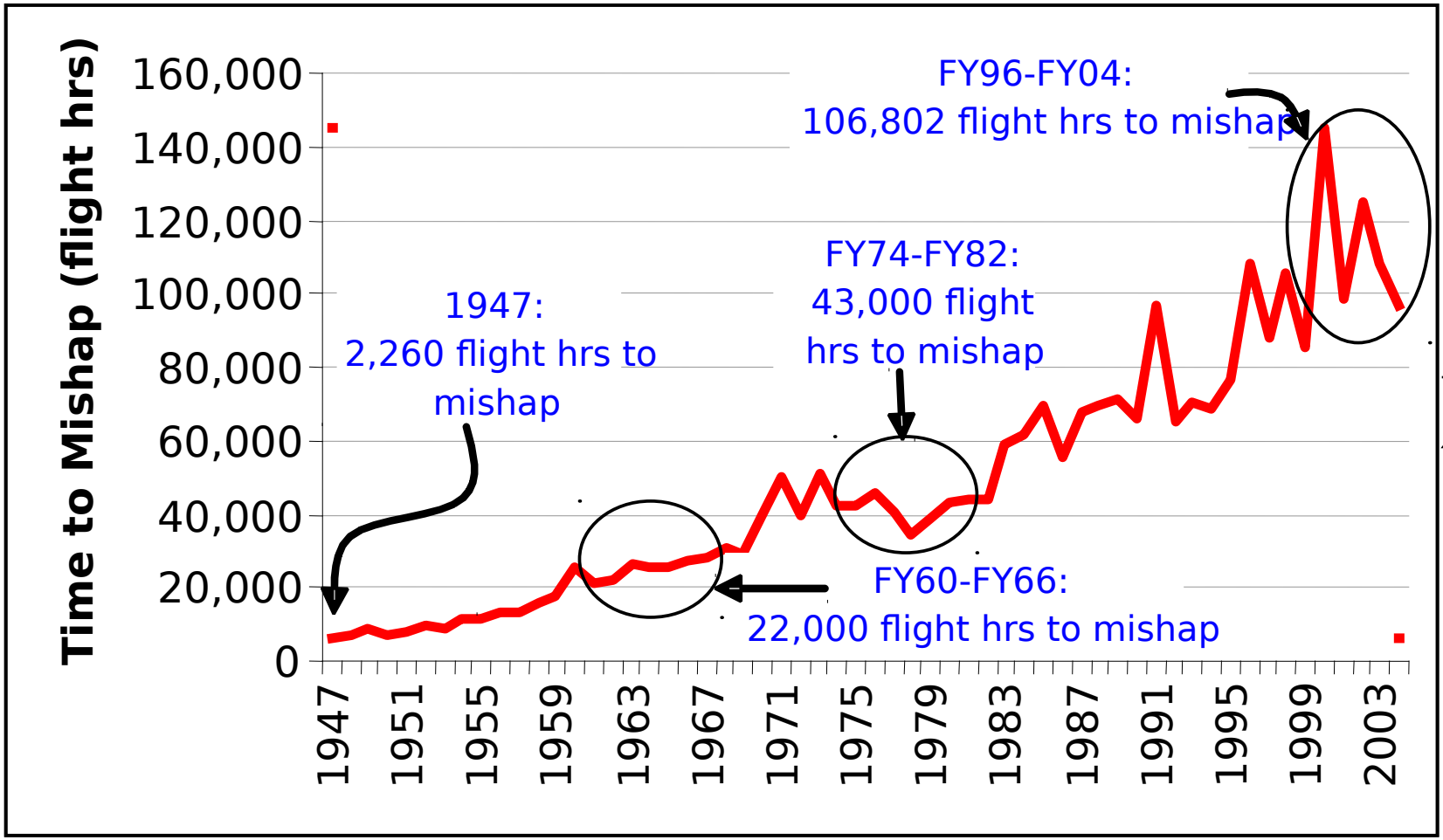
Long-term view of flight safety
1921-2003

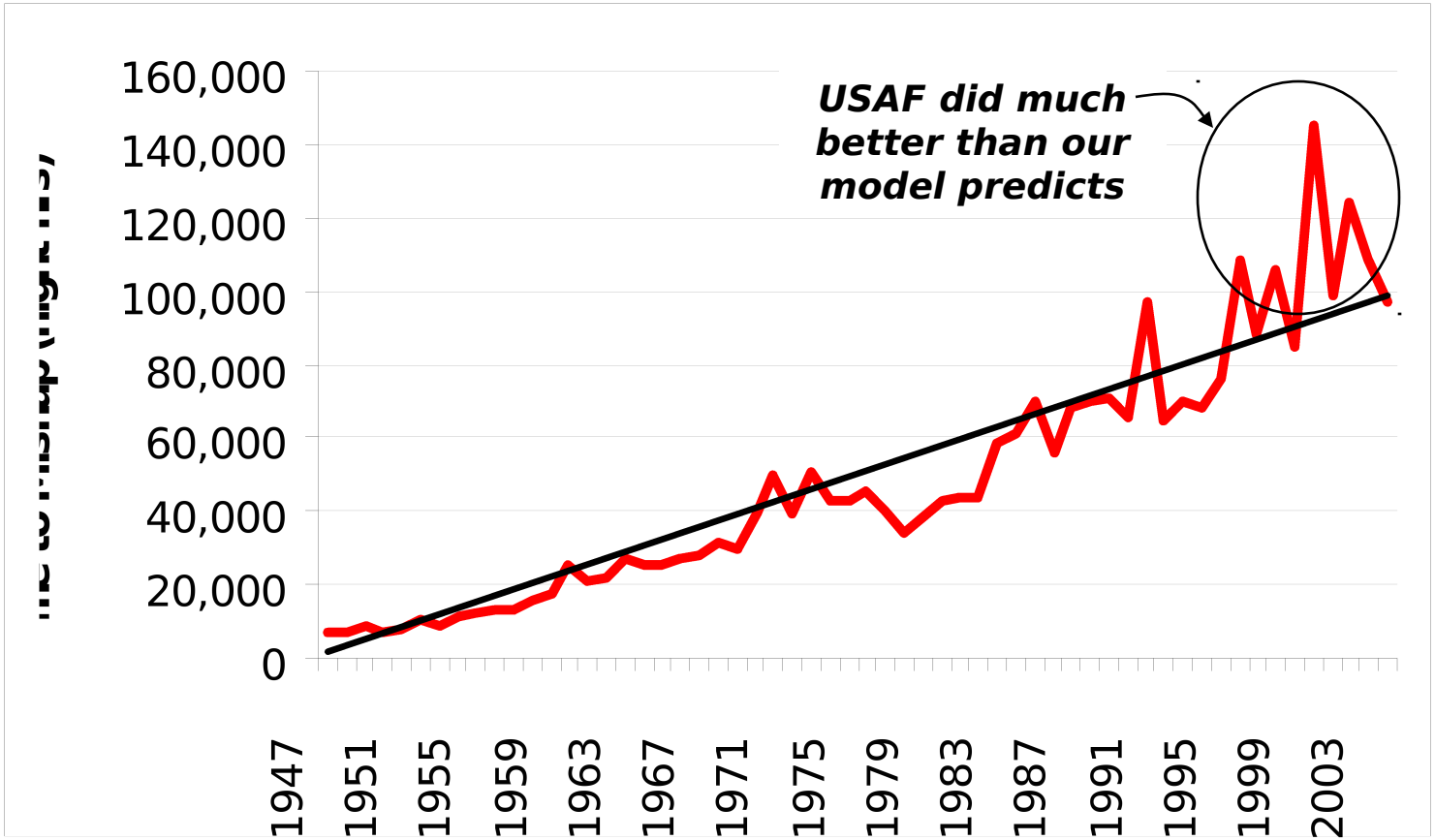



USAF Flight Class A Mishap Rates
1947-2002
Rate
Korean War
Vietnam War
Desert Storm
Operation Enduring Freedom
47
57
67
77
87
97
02
First use of ejection seat by US pilot in operational aircraft
F-80C shoots down MIG-15 in first jet dogfight
F-100 initiates Century-series fighter
Three B-52s complete first non-stop flight around world
Thor-Delta launches first geo-synchronous satellite
X-15 sets absolute speed record for winged flight–Mach 6.7
Air Force Inspection and Safety Agency activated
First Red Flag exercise
Columbia makes first space shuttle flight
Existence of F-117 stealth fighter revealed
GPS satellite Constellation achieves full operational capability
Airborne Laser is first aircraft procured in new century

Time to Class A Mishap, 1947-2004
(Avg flight hour interval between mishaps)



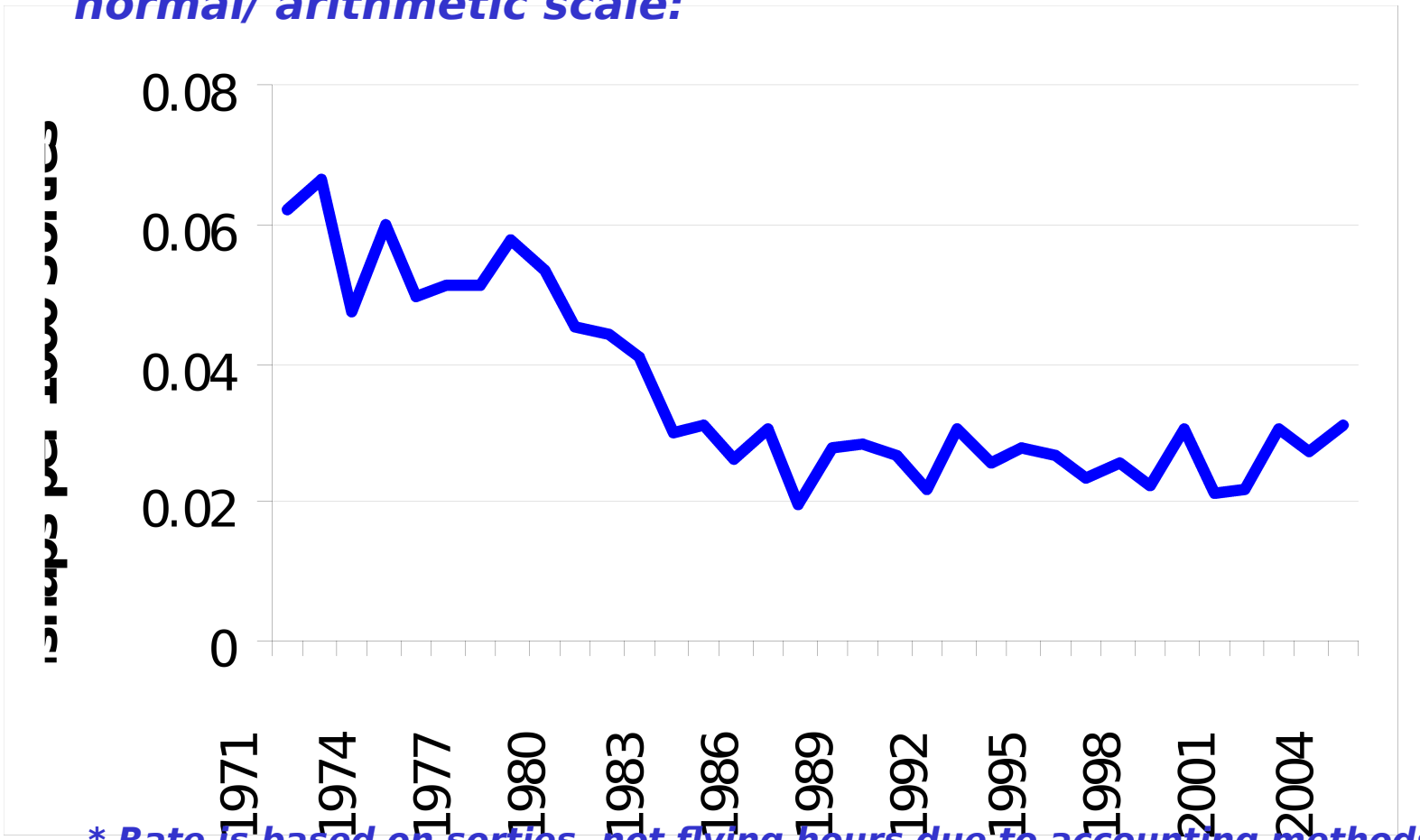
Time to Mishap – Linear Trend



Combat losses vs Class A non-combat mishaps

Comparison of sortie-based rates, 1971-2004

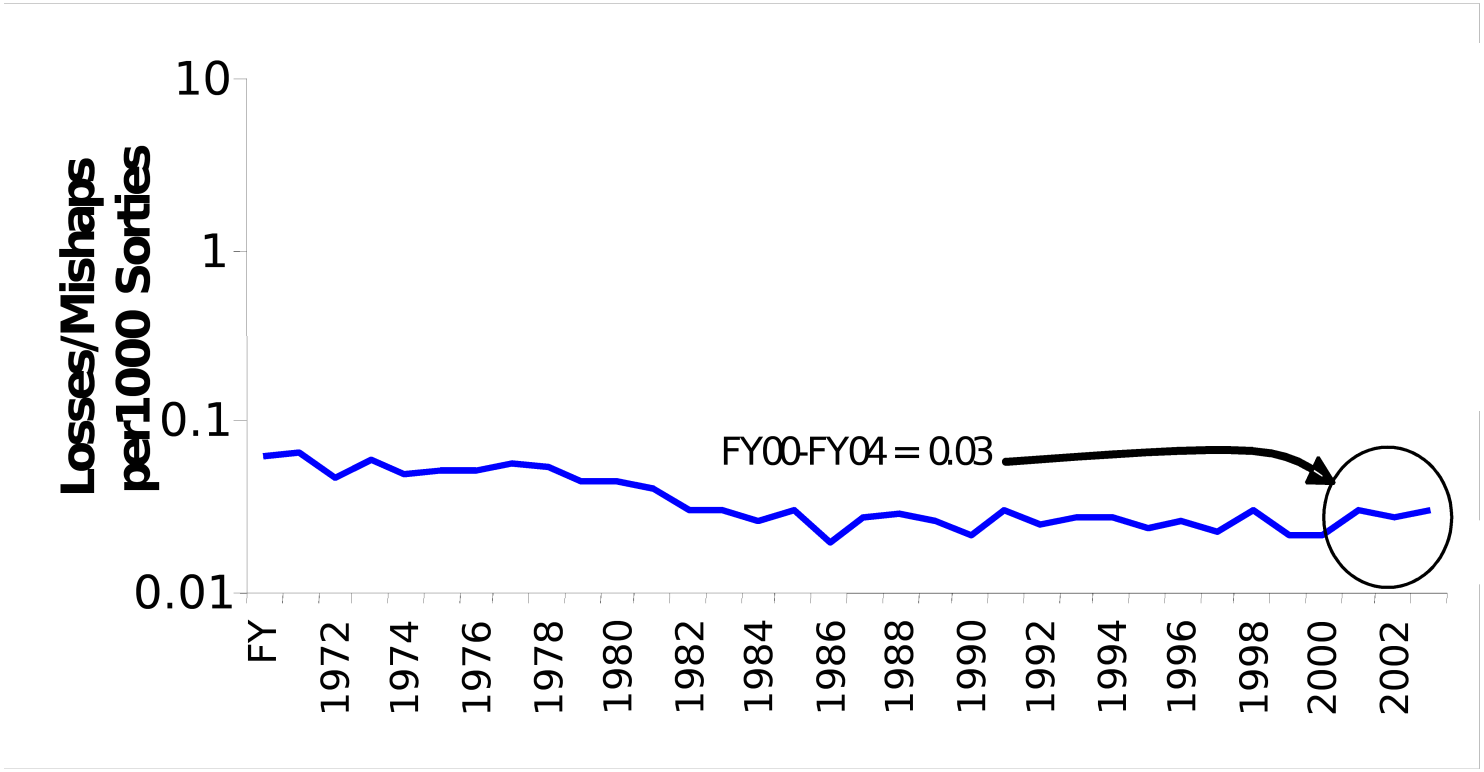
First, the non-combat mishap rate* is presented on a normal/ arithmetic scale:



** Rate is based on sorties, not flying hours due to accounting methods in past conflicts*

Non-combat mishap rate

Same numbers, different (log) scale



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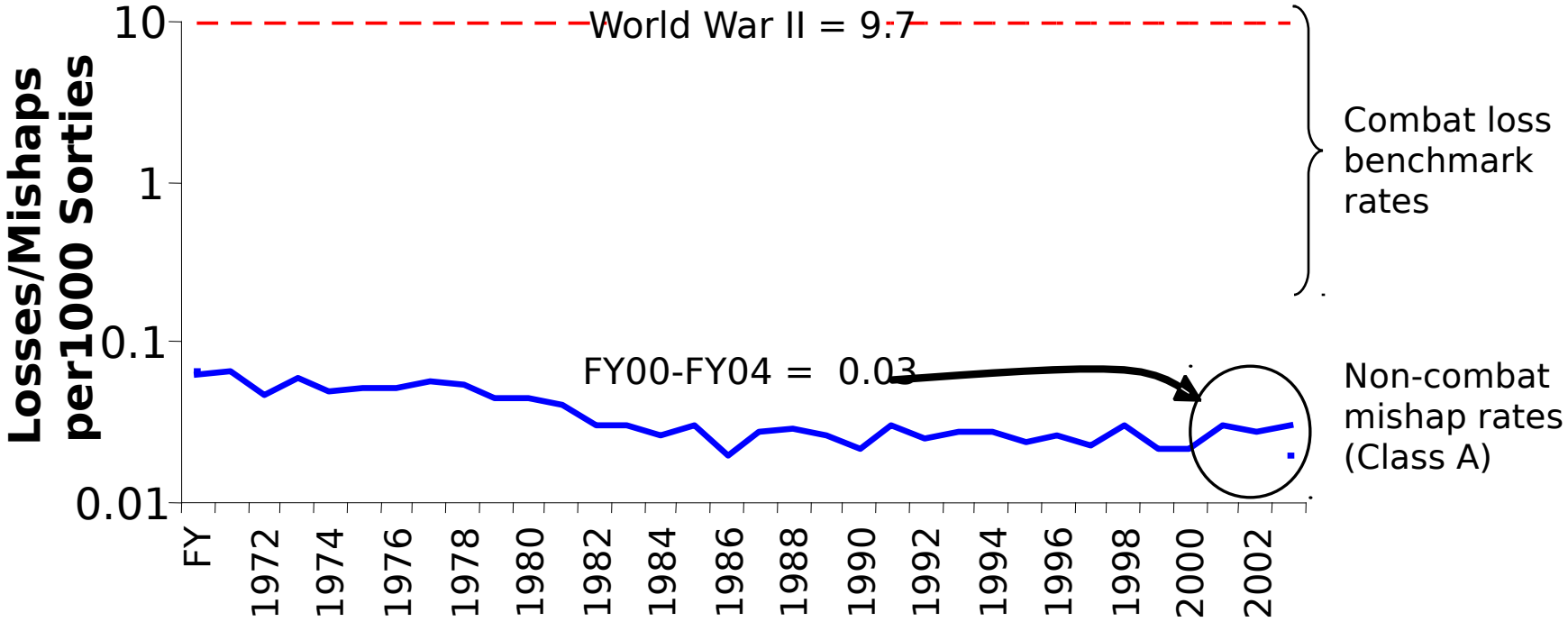
Comparison of sortie-based rates, 1971-2004



Combat losses vs non-combat mishaps

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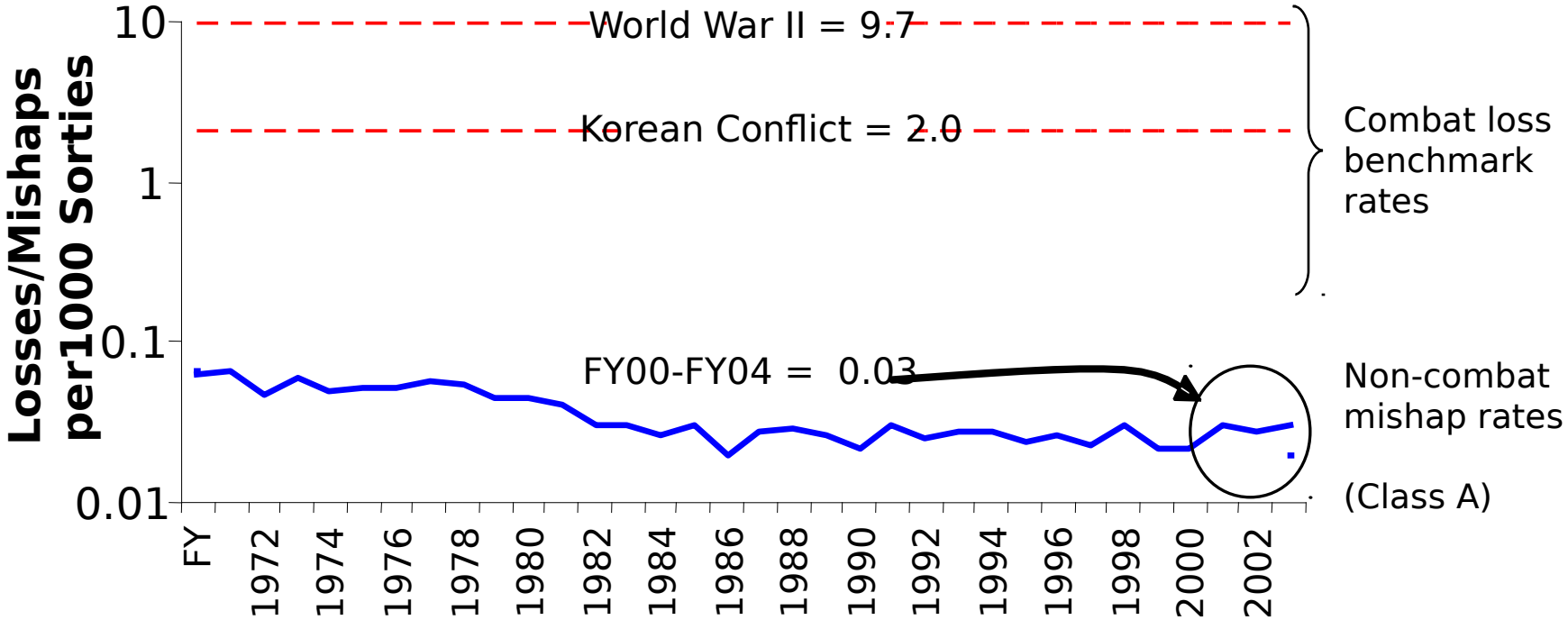
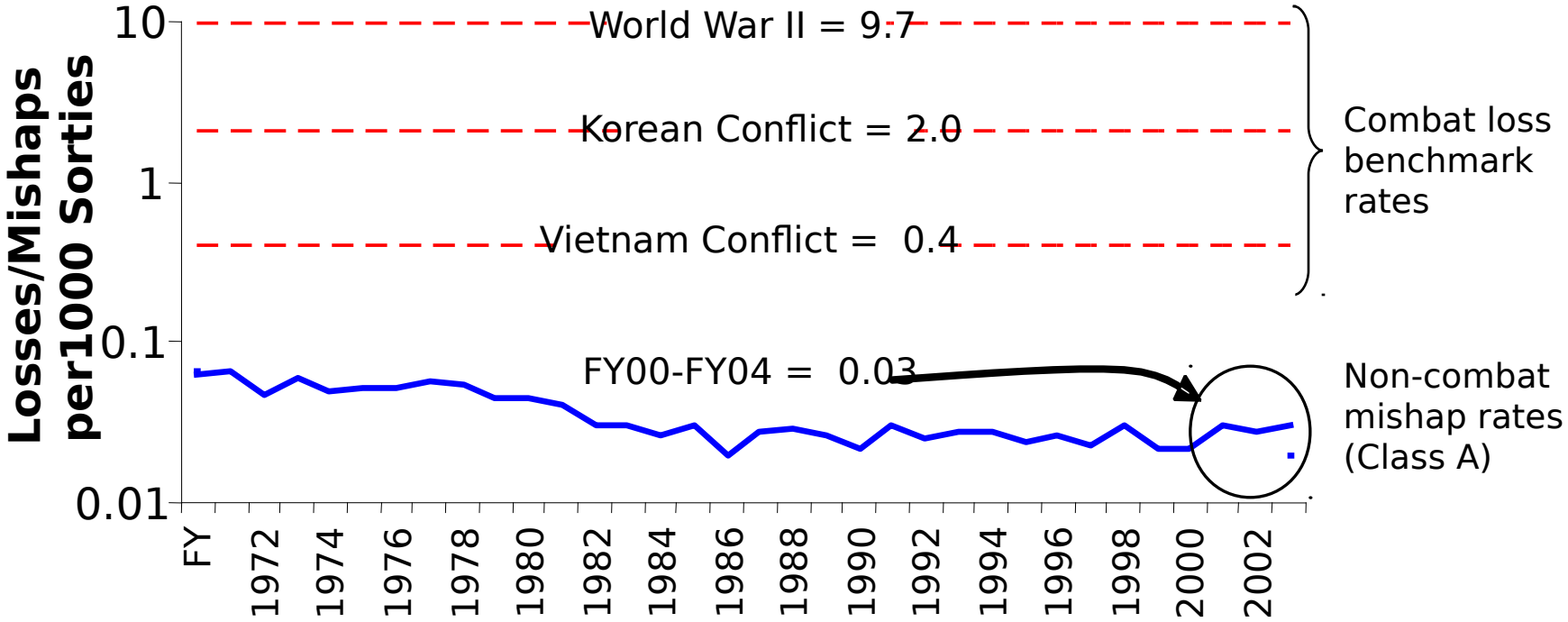


Note: Vertical (Y) axis on logarithmic scale to compensate for the magnitudes of difference between the period-based rates

Combat losses vs non-combat mishaps

Comparison of sortie-based rates, 1971-2004



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Combat losses vs non-combat mishaps

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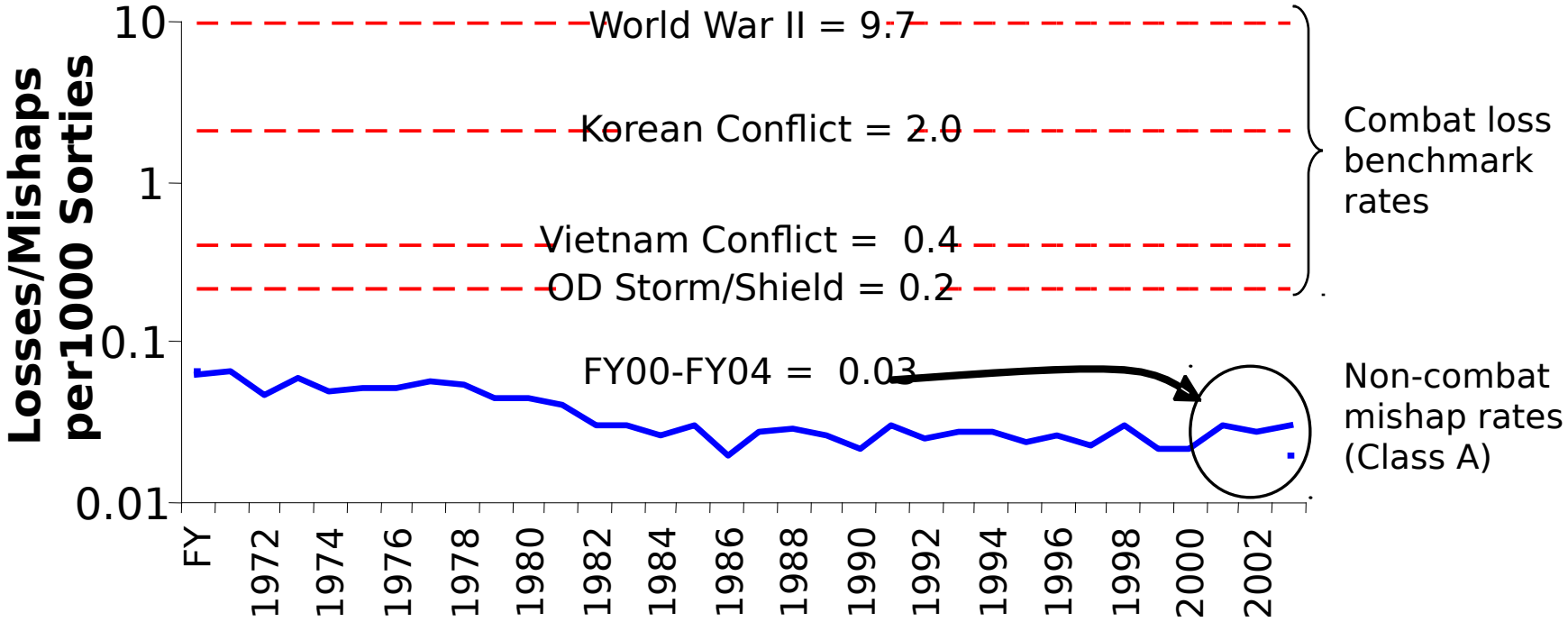

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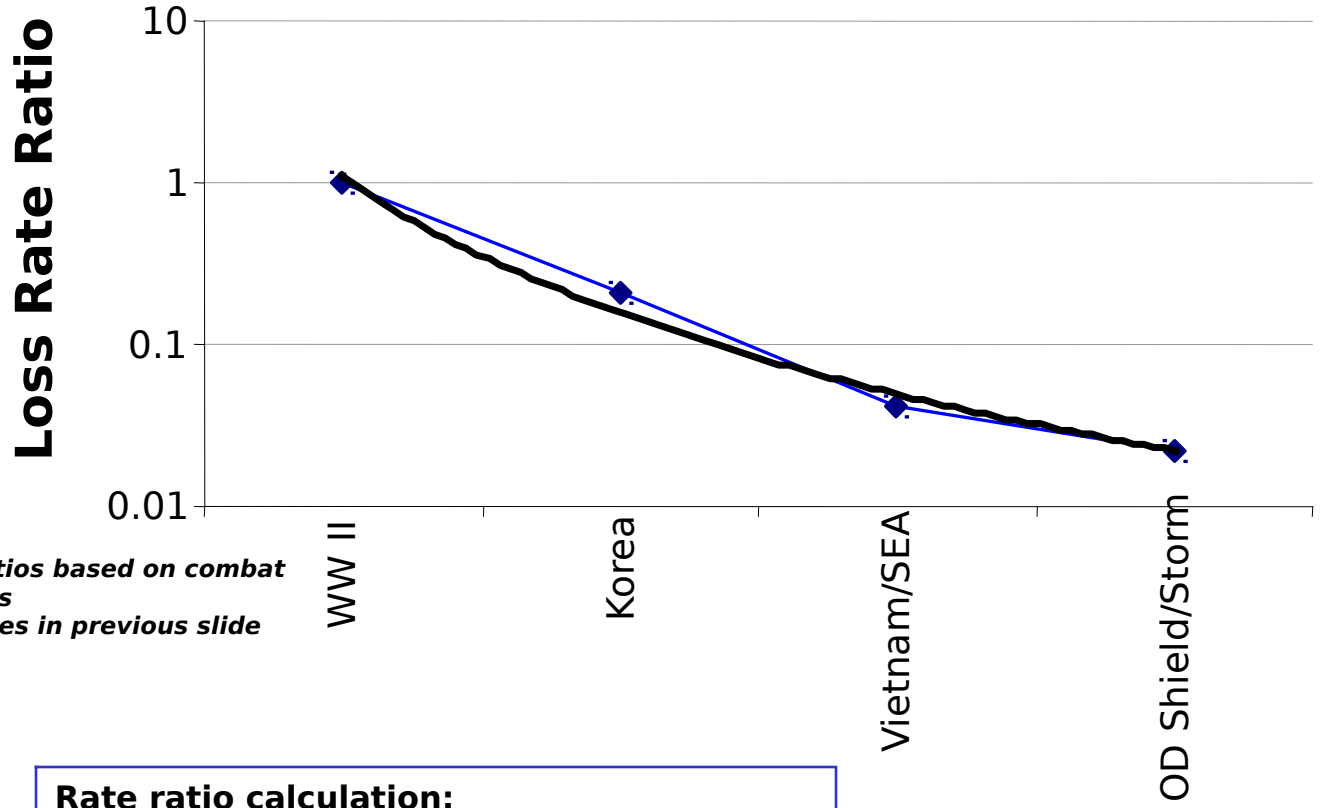
Combat loss prediction?



Ratios based on combat loss rates in previous slide

Rate ratio calculation:

Loss rate in [conflict] / WW II loss rate
(thus all ratios are relative to WW II as the model's reference rate)

Predicted combat loss rates

Conflict	Combat sorties	A/C losses	Rate/ 1000 sorties
WW II	2,362,800	22,948	9.70
Korea	710,886	1,466	2.00
Vietnam/SEA	5,226,701	2,256	0.40
OD Shield/Storm	65,581	14	0.21
Prediction for OIF/OEF	data still accumulating		0.11

Detailed statistics on combat vs non-combat losses—planes and aircrew

World War II data

Year	Aircraft destroyed, non-combat	Aircraft destroyed, combat	
1941	228	411	
1942	1,259	1,727	
1943	3.954	6.619	
1944	2.317	20.394	
1945	368	12.424	Ratio
	8,126	41,575	5.1

Year	Aircrew killed, non-combat	Aircrew killed in combat	
1941	252	315	
1942	2,384	3,477	
1943	5,603	10,002	
1944	4.973	21.074	
1945	2.174	4.600	Ratio
	15,386	39,468	2.6

Korean Conflict data

Year	Aircraft destroyed, non-combat	Aircraft destroyed, combat
1950	665	
1951	824	750
1952	789	
1953	945	
	3,223	750

Ratio
0.2

	Aircrew killed, non-combat	Total crew killed, combat
1950	781	
1951	1,015	800
1952	1.214	
1953	949	
	3,959	800

Ratio
0.2

Vietnam Conflict

Year	Aircraft destroyed, non-combat	Aircraft destroyed, combat
1961	321	1
1962	302	9
1963	246	16
1964	261	40
1965	262	225
1966	262	376
1967	263	411
1968	258	384
1969	251	275
1970	167	161
1971	112	86
1972	137	195
1973	85	18
	2,927	2,197

Ratio 0.8

	Aircrew killed, non-combat	Total crew killed, combat
1961	297	7
1962	373	19
1963	219	37
1964	333	40
1965	477	220
1966	315	350
1967	332	426
1968	309	506
1969	389	274
1970	334	291
1971	129	66
1972	163	195
1973	163	18
	3,833	2,449

Ratio 0.6

Operation Desert Shield/Storm

Year	Aircraft destroyed, non-combat	Aircraft destroyed, combat
1990	52	14
1991	38	
	90	14

Ratio 0.2

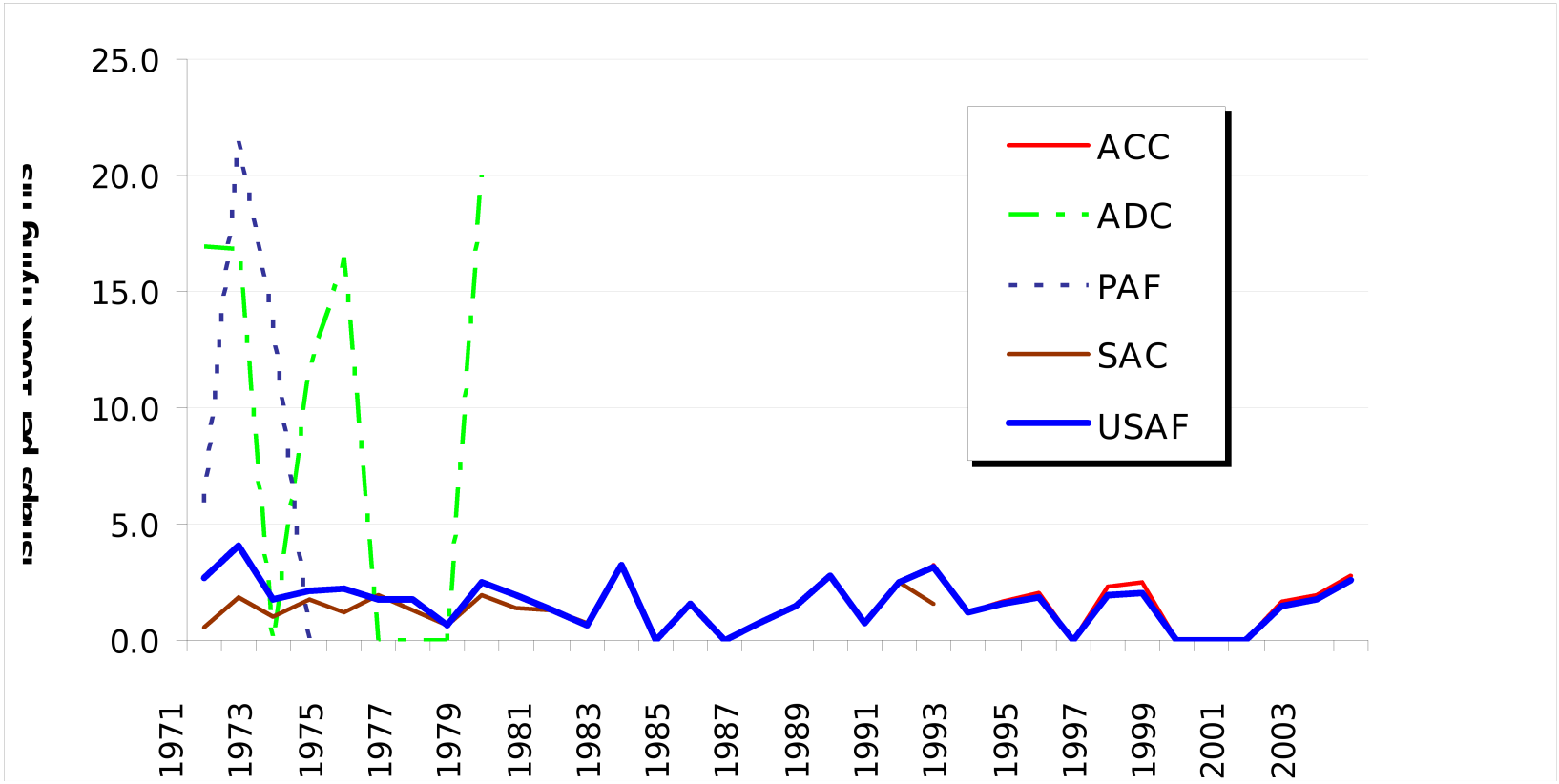
	Aircrew killed, non-combat	Total crew killed, combat
1990	43	18
1991	18	
	61	18

Ratio 0.3

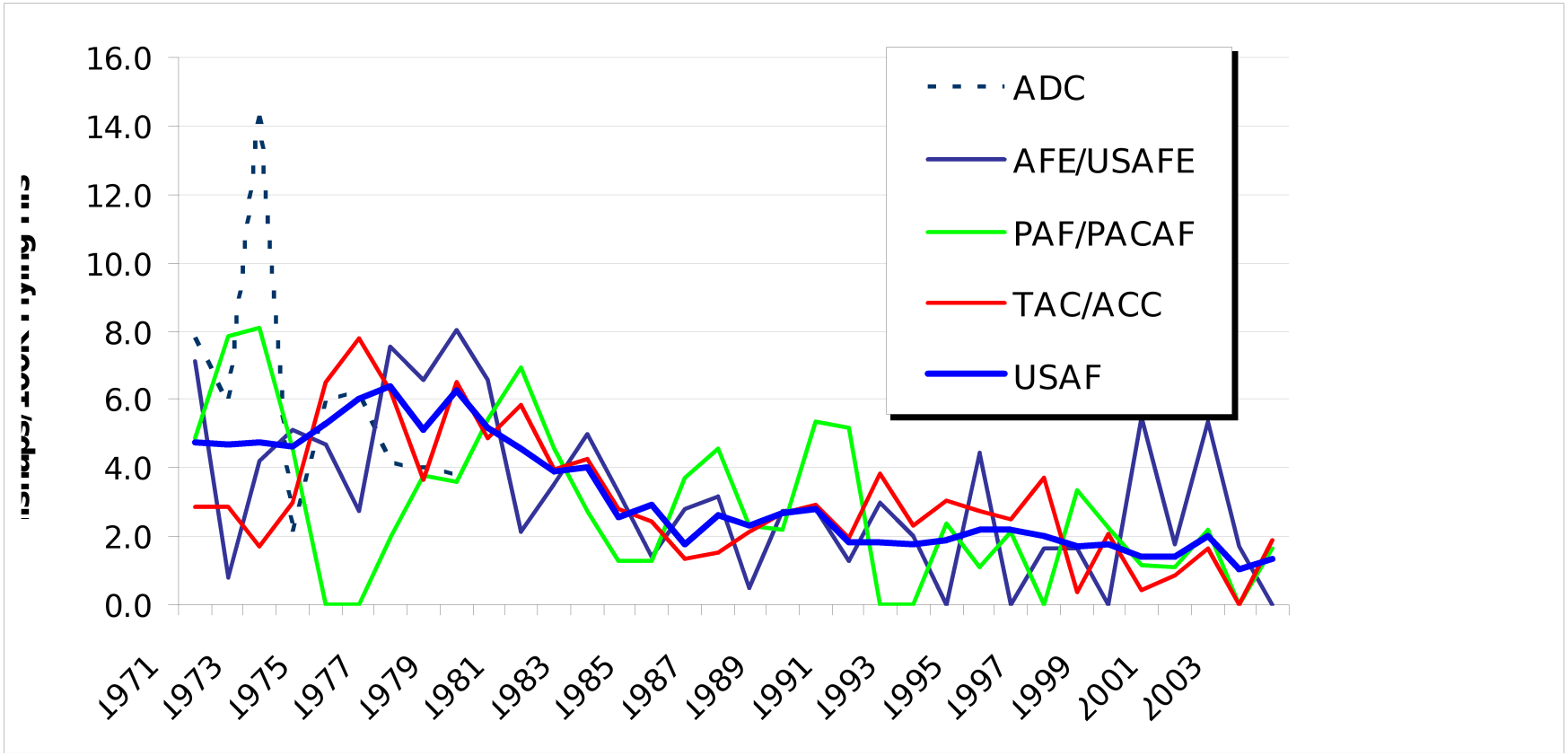
Historical look at yearly rates: MDS category by FY and MAJCOM

MDS categories: fighter/attack, bomber, cargo/tanker

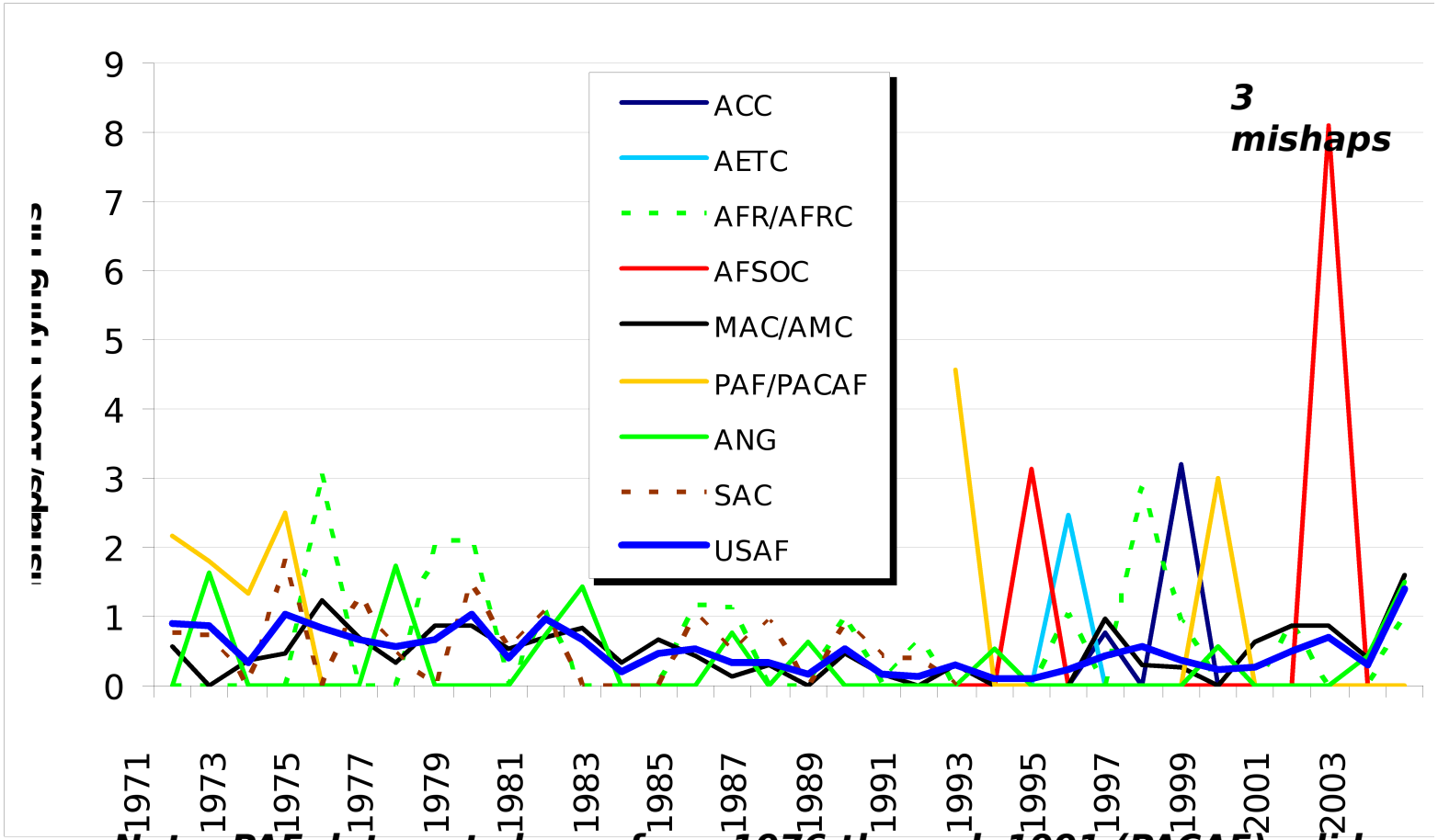
Bombers, Class A Mishap Rates By MAJCOM and Yr ('71 - '04)



Fighter/Attack, Class A Mishap Rates By MAJCOM and Yr ('71-'04)



Cargo/Transport/Tanker, Class A Mishap Rates
By MAJCOM and Yr ('71-'04)



Note: PAF data not shown from 1976 through 1991 (PACAF)—did not fly 10% of USAF hours, resulting in erratic rates